

# *epi*TRENDS

A Monthly Bulletin on Communicable Disease Epidemiology and  
Public Health Practice in Washington State

## ***Salmonella* Enteritidis Infections Associated with Shell Eggs**

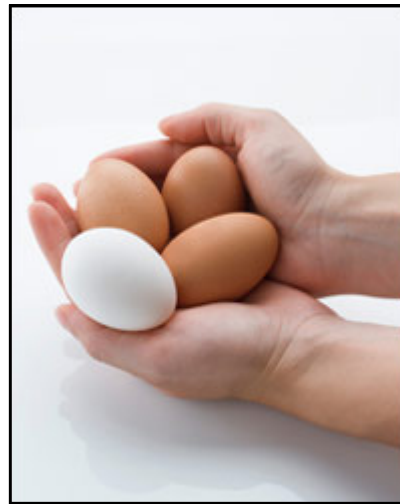
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For many years cracked shell eggs were recognized as carrying a risk for contamination with *Salmonella*. During the past several decades, *S. Enteritidis* infections were associated with intact shell eggs. Beginning in May 2010 a large national outbreak of *S. Enteritidis* was linked to such eggs.

### **Public Health Discussion Points**

Here are three discussion points related to the national salmonellosis outbreak and to the prevention of salmonellosis from shell eggs. The answers are contained in the text, or you may refer to the answers at the end of this article.

1. How do eggs become contaminated with *Salmonella*?
2. What should people do to avoid becoming ill when eating or preparing meals with eggs?
3. What public health resources are involved with responding to interstate outbreaks?



Intact shell eggs are known  
to carry *S. Enteritidis*

Photo courtesy of CDC

## **Multistate Outbreak of *Salmonella* Enteritidis Infections Associated with Shell Eggs**

The Centers for Disease Control and Prevention (CDC), in collaboration with state and local health departments and other federal agencies, is investigating a multi-state outbreak of *Salmonella* Enteritidis (SE) associated with consumption of shell eggs. This year CDC identified a sustained increase in reports of SE with a specific pulsed field gel electrophoresis (PFGE) pattern ("pattern A") being reported to PulseNet, a national database of PFGE patterns used to track subtypes of enteric bacteria such as *Salmonella*.

*Continued page 2*

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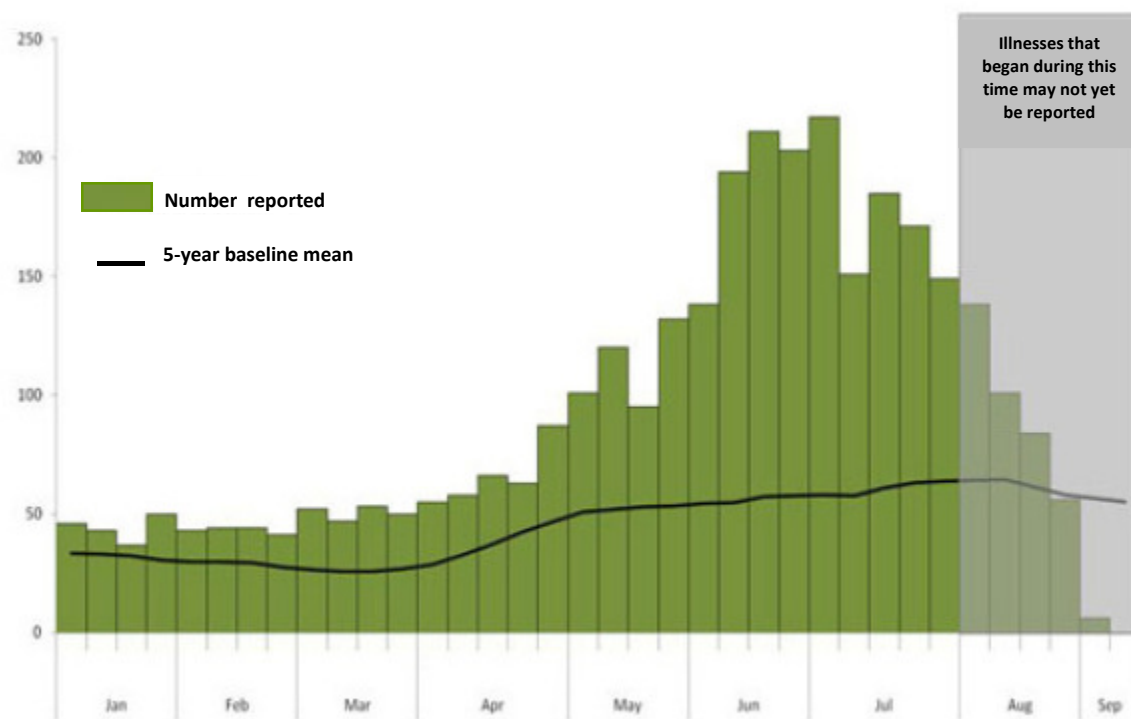
This particular PFGE pattern is the most common SE pattern reported to PulseNet; prior to the outbreak, pattern A was reported about 200 times every month in the United States. However, in May through August, 2010, over 2500 illnesses due to isolates with this pattern were reported nationwide (Figure 1). Since this is a common pattern, not all of these reported isolates were associated with the outbreak, which complicated the investigation. An emphasis was therefore placed on investigating clusters of cases with common retail sources.

Since April 29<sup>th</sup> restaurant or event clusters of SE pattern A in ten states have been investigated. Many of these investigations have implicated shell eggs as the source of illness. For half of these clusters, the implicated shell eggs came from a common supplier in Iowa. Other investigations suggested a second farm as a potential source. Environmental testing indicated that these two farms are the likely sources of the contaminated shell eggs.

For additional information regarding the outbreak investigation see:

<http://www.cdc.gov/salmonella/enteritidis/>

Figure 1: Number of *Salmonella* Enteritidis cases matching PFGE Pattern A reported to PulseNet, United States, 2010



\*Date of isolation by week.

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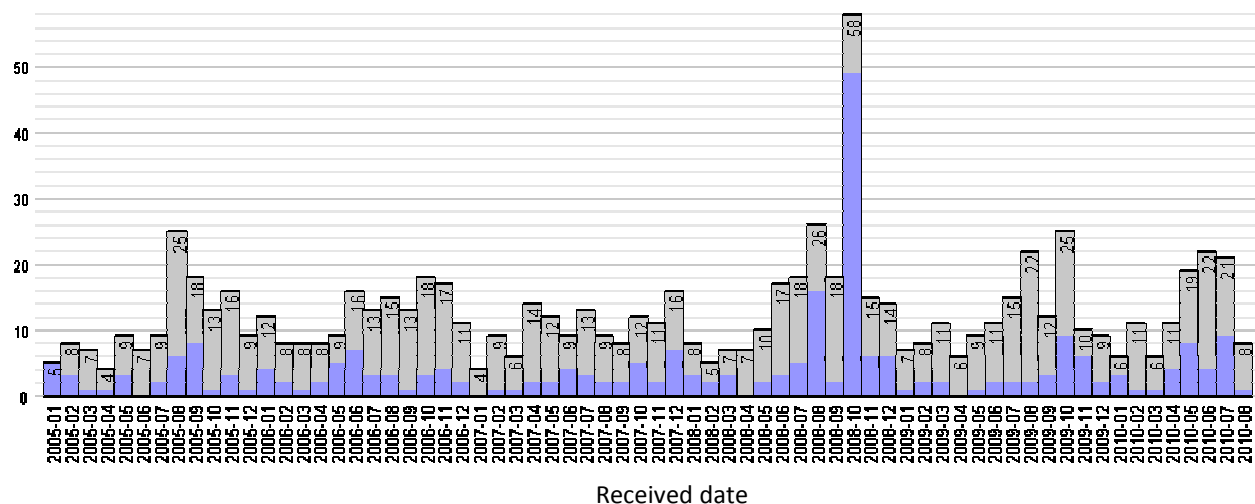
## Salmonella Enteritidis in Washington

Every year, the Washington State Department of Health (DOH) receives 600–850 reports of salmonellosis. In general, salmonellosis can be divided into two groups, typhoidal (caused by *S. Typhi*) and non-typhoidal. SE is one type of non-typhoidal salmonellosis. Non-typhoidal salmonellosis is a bacterial infection which can cause diarrhea, including bloody diarrhea, fevers and vomiting. Illness may be particularly severe in the elderly, infants, and persons with immunodeficiencies. Laboratories in Washington are required by the Washington Administrative Code (WAC) to submit all *Salmonella* isolates from infected patients to the Washington State Public Health Laboratories for serotyping and additional analysis by PFGE.

SE is one of the most common *Salmonella* serotypes identified in Washington residents with salmonellosis. As seen nationally, the strain associated with the outbreak described here is a strain commonly reported in Washington residents as sporadic cases, accounting for up to 10 infections per month.

In contrast to the national data, DOH has not identified a recent marked increase in the number of SE isolates with the outbreak PFGE Pattern A in Washington (Figure 2). In 2008, SE strains with PFGE Pattern A did cause a large restaurant outbreak where eggs were not implicated as a vehicle. No SE restaurant or event clusters have been identified in Washington during the time frame of this outbreak.

Figure 2: Number of *Salmonella* Enteritidis case Washington, 2005 – 2010. Lower blue bars represent cases matching the outbreak PFGE Pattern A.



## Salmonella and Shell Eggs

Domestic poultry carry *Salmonella* in their intestinal tracts, with potential transmission to humans through direct contact or consumption of poultry products and eggs. There are two main routes of egg contamination. External fecal contamination can enter cracks in egg shells. To address this, the egg industry initiated surface cleaning of shells and egg inspection to reduce the risk of contaminated cracked eggs being sold commercially.

It is now known that SE can also occur within intact and surface-disinfected eggs. Healthy-appearing hens can have infected ovaries and contaminate eggs before shell formation. Beginning in the 1980s, SE infections associated with intact eggs were recognized in northeastern states with subsequent spread to other parts of the country.

## Preventing Salmonellosis from Shell Eggs

People should not eat eggs that have been recalled. To date, DOH has determined that very little implicated product had been distributed in Washington. A list of recalled products is available at <http://www.accessdata.fda.gov/scripts/shelleggsrecall/>. Although little of the implicated product has come to Washington, there remains a risk of salmonellosis from raw eggs. Illness can be particularly severe in the young, elderly, and immunodeficient. People who develop severe diarrhea, vomiting, or fever after eating raw or undercooked eggs should consult with their healthcare providers.

To prevent salmonellosis from shell eggs, person should always do the following:

- Keep eggs refrigerated at  $\leq 45^{\circ}\text{F}$
  - Throw away dirty or cracked eggs
  - Use eggs promptly after opening the shells
  - Wash hands with soap and water after contact with raw eggs
  - Clean and disinfect surfaces and cooking utensils after contact with raw eggs
  - Cook all eggs until the white and yolk are firm and eat them promptly after cooking
  - Avoid eating raw or undercooked eggs including in uncooked recipes (e.g., Caesar salad, homemade eggnog)
  - Refrigerate egg-containing foods promptly
- 

## Answers to Public Health Discussion Points

1. How do eggs become contaminated with *Salmonella*?  
Eggs can become contaminated if feces enter cracks in the shells or if the laying hen has ovarian colonization with *Salmonella*.
2. What should people do to avoid becoming ill when consuming eggs?  
Thoroughly cook all eggs and foods made with raw eggs. Avoid contaminating uncooked foods with kitchen utensils used with raw eggs. Promptly refrigerate eggs and foods made with eggs.
3. What public health resources are involved with responding to interstate outbreaks?  
Multiple public health resources are involved with interstate outbreaks including local health jurisdictions, state department of health epidemiology and food safety offices, state public health laboratories, Centers for Disease Control and Prevention (CDC) epidemiologists, CDC's PulseNet system, and the federal food protection agency (USDA or FDA). Coordination among these resources is essential during investigations of foodborne illness clusters.